

Second Preliminary Amendment  
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**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of the Claims:**

1-28 (canceled)

29 (previously presented): A method for dissociating gases comprising:

- a) confining a gas in a plasma chamber at a pressure;
- b) providing a transformer having a magnetic core surrounding a portion of the chamber and having a primary winding;
- c) generating an AC current using a solid state AC switching power supply comprising one or more switching semiconductor devices and having an output that is coupled, without requiring the use of a conventional impedance matching network, to the primary winding of the transformer; and
- d) inducing an AC potential inside the plasma chamber by supplying the current, without requiring the use of the conventional impedance matching network, to the primary winding of the transformer, the induced AC potential forming a toroidal plasma that completes a secondary circuit of the transformer and that dissociates the gas.

30-43 (canceled)

44 (previously presented): The method of claim 29 further comprising generating the current using a solid state AC switching power supply comprising one or more switching transistors.

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- 45 (previously presented): The method of claim 29 wherein the output of the AC switching power supply is coupled, without using the conventional impedance matching network, to the primary winding of the transformer and wherein the AC switching power supply supplies, without using the conventional impedance matching network, the current in the primary winding.
- 46 (currently amended): A ~~toroidal~~ toroidal plasma chamber for use with a reactive gas source comprising:
- an inlet for receiving a gas;
  - at least one plasma chamber wall for containing the gas, the plasma chamber wall comprising at least one of a metallic material or ~~and~~ coated metallic material;
  - at least one dielectric spacer that electrically isolates the plasma chamber into a plurality of portions to prevent induced current flow from forming in the plasma chamber itself, the dielectric spacer being protected from a plasma formed in the plasma chamber by at least one plasma chamber wall; and
  - cooling channels for passing a fluid that controls the temperature of the plasma chamber.
- 47 (previously presented): The plasma chamber of claim 46 wherein the dielectric spacer is protected from the plasma by a protrusion in at least one plasma chamber wall.
- 48 (previously presented): The plasma chamber of claim 46 wherein the dielectric spacer is protected from the plasma by at least one protruded plasma chamber wall.
- 49 (previously presented): The plasma chamber of claim 48 wherein the dielectric spacer is disposed in a recess adjacent the at least one protruded plasma chamber wall.
- 50 (previously presented): The plasma chamber of claim 46 further comprising a vacuum seal disposed adjacent the dielectric spacer.

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51 (currently amended): A toroidal plasma chamber for use with a reactive gas source comprising:

an inlet for receiving a gas;

one or more chamber walls for containing the gas, the chamber walls comprising at least one of a metallic material, coated metallic material or and dielectric material; and

at least one dielectric spacer that electrically isolates a region of the plasma chamber to prevent induced current flow from forming in the plasma chamber itself, the at least one dielectric spacer being protected from a plasma formed in the plasma chamber by one or more of said plasma chamber walls.

52 (previously presented): The plasma chamber of claim 51 wherein the dielectric spacer is protected from the plasma by a protrusion in one or more of said plasma chamber walls.

53 (currently amended): The plasma chamber of claim 51 wherein the dielectric spacer is protected from the plasma by at least one or more protruded plasma chamber walls.

54 (previously presented): The plasma chamber of claim 53 wherein the dielectric spacer is disposed in a recess adjacent the one or more of said plasma chamber walls.

55 (previously presented): The plasma chamber of claim 51 further comprising a vacuum seal disposed adjacent the dielectric spacer.